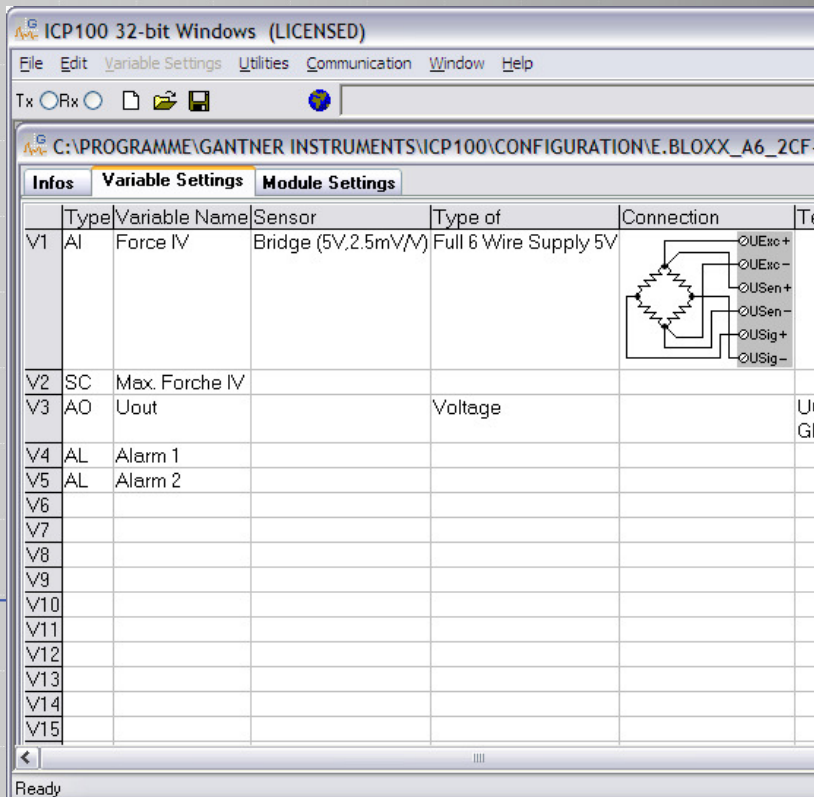
Gantner instruments

e.series

Manual

ICP 100



Vers.-Nr. 300

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Important: Before commencing installation, commissioning, putting into service and before any maintenance work is carried out, it is essential that the relevant warning and safety instructions in this manual are read!

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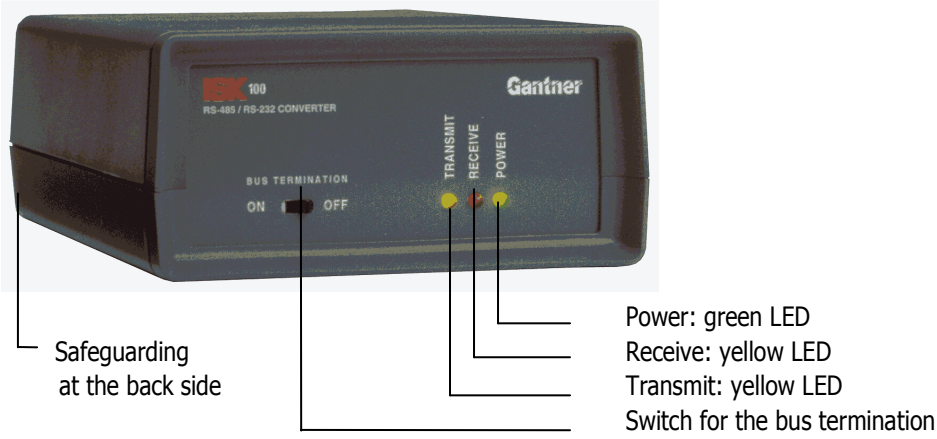
1. CONTENTS OF THE DEMO KIT

- ISM 111 Intelligent Sensormodul
- ISK 200 Interface converter
- ICP 100 Configuration software
- ISM SSB Sensor-Simulations-Board
- interconnecting cables
- Software manual

2. INSTALLING THE HARDWARE

The bus interface of the Sensor Module is based on the RS-485-Standard. As the master computer usually is equipped with a RS-232-Interface an interface converter has to be used, the ISK 200, which is a desktop model. This ISK 200 needs a 220V power-supply.



The ISK100 is connected to the master computer via a serial interface. As soon as the ISK 200 is power-supplied the Power-LED is shining.

If the LED is still dark, it could be caused by the following reasons:

- The power-supply is interrupted.
- The safeguarding is damaged and has to be replaced.
- If point 1 and 2 are not true, the ISK 200 is damaged and has to be replaced.

Afterwards the ISK 200 has to be connected to the ISM 111 / e.bloxx A1-1 with an interface-cable (4 contacts), fixed on the upper side of the module. Now the green LED (RUN) of the ISM111 is lighted and the red LED (ERR) could be flashing.

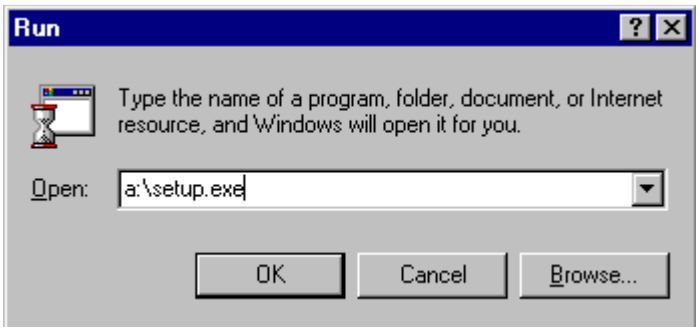
Last but not least the Sensor-Simulations-Board has to be connected to the ISM 111 / e.bloxx A1-1 at the lower side of the module.

3. INSTALLING THE CONFIGURATION SOFTWARE

The ICP 100 is the required software to configure all the modules of the series ISM 100, IDL 100, e.bloxx and Q.bloxx.

Now the installation of the software ICP 100 is being described step by step:

Start the installation by typing a:\setup.exe



The further steps for the installation of the software are being described online.

The configuration software is available as DEMO-version and as licenced version.

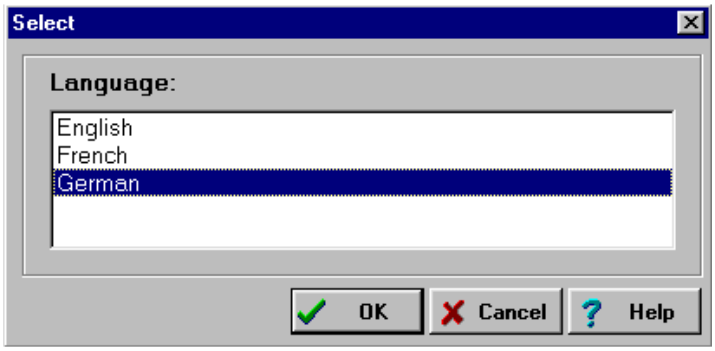
ICP 100 - DEMO:
With the DEMO-Version you can create configurations but it is not possible to write data into the module. You only can read data out of the module.

ICP 100 - Advanced:
The Configuration Software ICP100 as a licenced version provides full functionality. For data loggers the modem communication is supported and the Profibus-DP protocol is supported as well for all the modules which are capable of this protocol (all except data loggers). It also contains the required GSD-Files and Type-files for the connection with Profibus-systems.

4. FIRST STEPS

After hardware and software have been installed, you have to start the program. The first time you do this, several settings have to be done. The next time you start you will get to the working platform automatically.

At the beginning you will be asked to choose the language you want to work with. 3 languages (English, French and German) are available. Mark the right one and confirm with "*OK*".



The following interfaces are available:

- RS232 - Direct
- RS232 - Standard modem
- RS232 - RF-Modem
- TCP-IP Socket

To work with the DEMO-Kit select "*RS232 - Direct*".

As ComPort select an interface, which has not, been used yet.

Remark: The mouse is already connected to one of these interfaces!

After all the communication settings have been done - you can change them afterwards, too ("*Communication*" and "*Parameters*..." in the menu bar) - a window appears, where you are asked about the license.

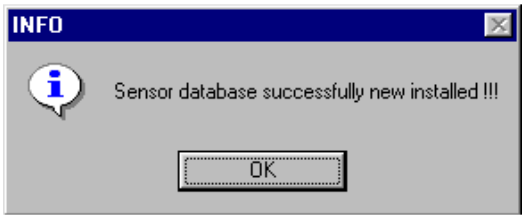
4.1. Starting the DEMO-Version:

You have two possibilities to use the software. If you do have a license-code you type it after clicking the button "License" and you can work with the complete version of the ICP100.

If you do not have a license-code you have to click the "*OK*"-button and you can work with the DEMO-Version which is reduced in its possibilities.

To begin with the starting of the DEMO-Version will be described. This DEMO-Version can be changed to a complete version without any problem. - This procedure will be described later on.

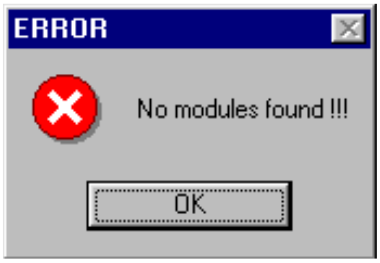
After clicking the "*OK*"-button you will be informed that the sensor-database has been installed:



During the initialization of the program the software automatically searches for an available module - but there also could be several modules. These modules will be shown including the transmission rate and the communications protocol.

Failure report:

If you get the following failure report the module/s is/are not connected to the master computer or the connection is incorrect. In this case watch the LEDs at the ISK100 when performing a manual bus-scan by clicking the symbol:



If the green "RUN"-LED on the module does not shine, please check whether the green "POWER"-LED at the converter ISK100 is shining or not. If it does not there is no power supply of the converter or the safeguard is faulty. As soon as the converter works without any problem watch out for the cables between the converter and the module.

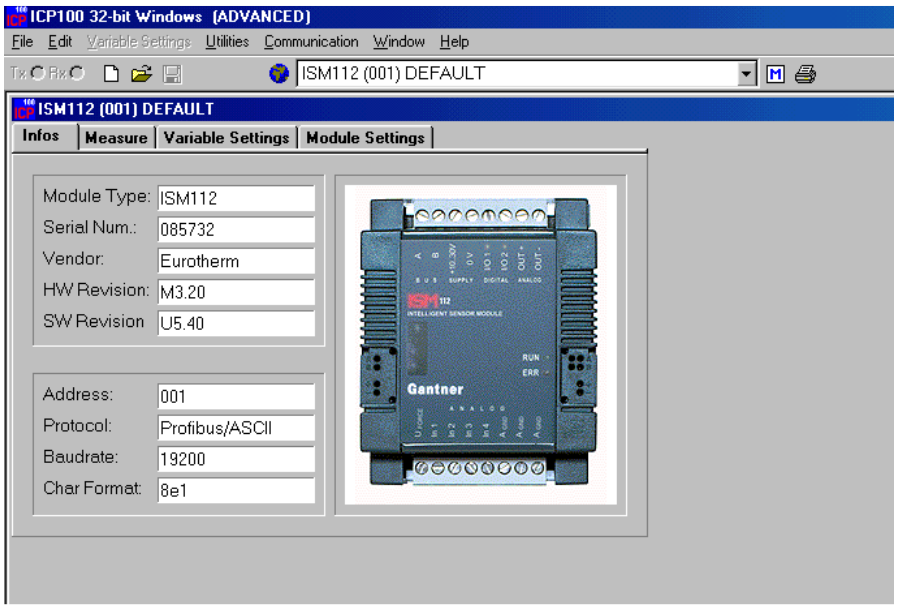
The LED "Transmit" does not shine:

- The COM-setting is faulty → check again the settings in the menu "C*ommunication*", "*Parameters...*"
- there are interface problems between the ISK100 and the master computer
- there could be hardware problems at the master computer
- if none of the upper causes is true, the ISK100 might be defect

The LED "Receive" does not shine:

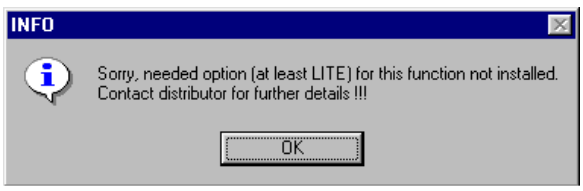
- the module is not connected to the system
- the bus connection is incorrect → check the bus connection at the module and at the ISK100 (A → A; B → B)
- the module's interface might be faulty.
  In this case please contact your Gantner-representative next to you.

Now the main program starts:



Now the software is ready for operation as a DEMO-Version.

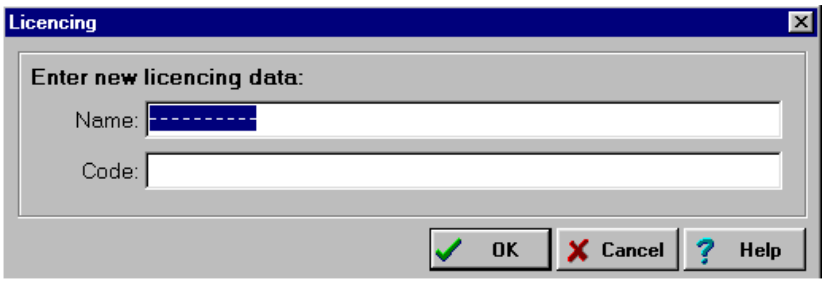
Hint:
With the DEMO-Version it is not possible to write data into the module. You only can read data from the module. If you try to write anyway you will find the following message:



4.2. Starting of the licensed version:

If you want to change to the complete version you have to select "*Help*" and afterwards "*About...*" from the menu bar. The window as shown in chapter 4.1 opens and you click the button "*License*".

The window opens and you type your data and the license-code, confirming with "*OK*". Once again you have to confirm with "*OK*" in the license-window - now the complete version is ready to use!



5. DESCRIPTION OF THE USER INTERFACE

Before describing all the different settings the most important buttons of the menu bar should be mentioned:

Open a new file

Open an existing file

Save the configuration

Manual bus scan

Send the configuration to the module

Printing the proper settings

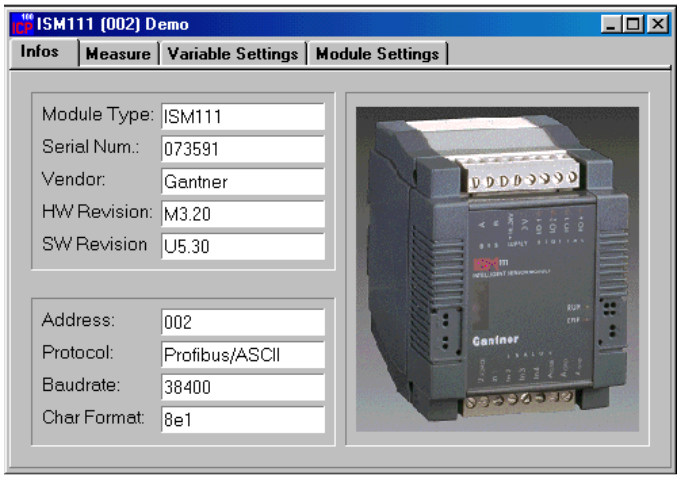
Software controlled changing of the instrument from the configuration mode to the operating mode (Profibus-DP) after finishing the con-figuration

As soon as a module is detected the following possibilities of configuration are shown in 4 different menus. But the ISM101 is an exception, the menus "Info" and "Measure" are shown as a common menu.

The menu "**Infos**" contains information about the

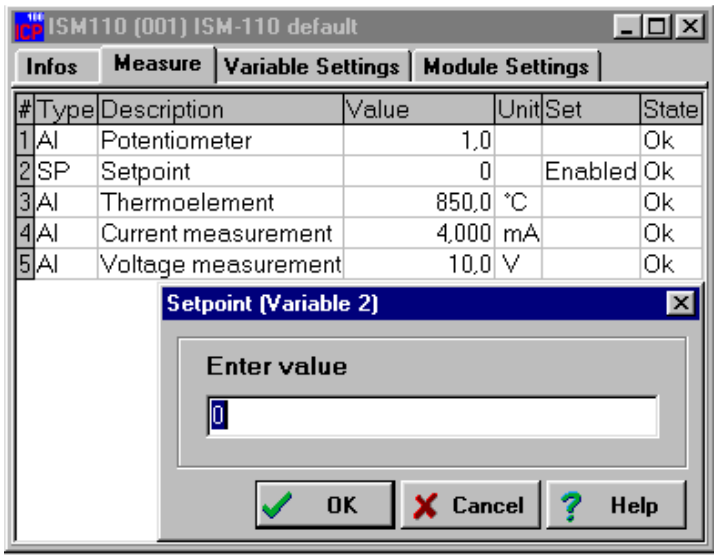
- Module Type
- Serial number
- Vendor
- HW-Revision
- SW-Revision
- Address
- Protocol
- Baudrate
- Character Format

of the connected module.



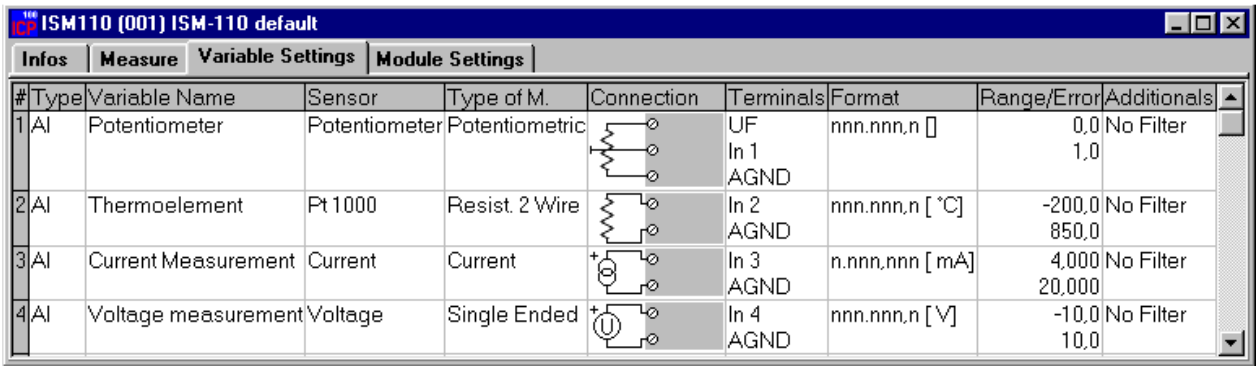
In the menu "**Measure**" you can find the current values and in the setpoint-channel the proper values can be entered.

But before you can do this all the variables have to be defined and sent to the module.



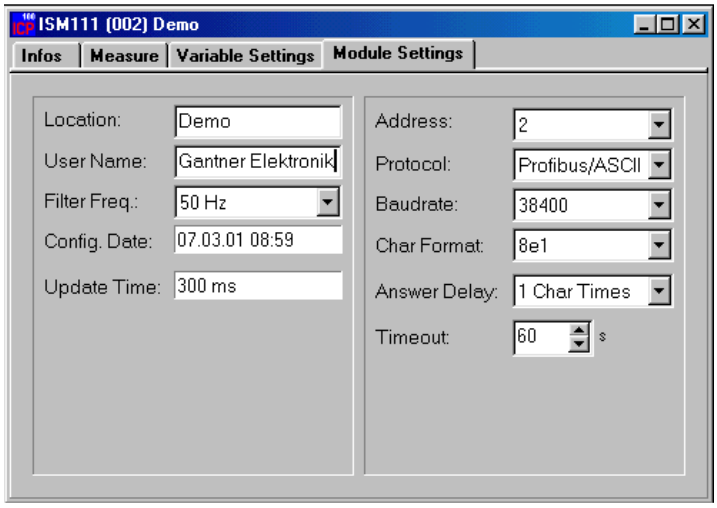
#	Type	Description	Value	Unit	Set	State
1	AI	Potentiometer	1,0			Ok
2	SP	Setpoint	0		Enabled	Ok
3	AI	Thermoelement	850,0	°C		Ok
4	AI	Current measurement	4,000	mA		Ok
5	AI	Voltage measurement	10,0	V		Ok

In the menu "**Variable Settings**" all the individual channels are configured. The module configurations are listed in a table channel by channel. The input and output channels can be defined and named, the type of measurement and the range can be defined, too.



#	Type	Variable Name	Sensor	Type of M.	Connection	Terminals	Format	Range/Error	Additionals
1	AI	Potentiometer	Potentiometer	Potentiometric		UF In 1 AGND	nnn.nnn,n []	0,0 1,0	No Filter
2	AI	Thermoelement	Pt 1000	Resist. 2 Wire		In 2 AGND	nnn.nnn,n [°C]	-200,0 850,0	No Filter
3	AI	Current Measurement	Current	Current		In 3 AGND	n.nnn,nnn [mA]	4,000 20,000	No Filter
4	AI	Voltage measurement	Voltage	Single Ended		In 4 AGND	nnn.nnn,n [V]	-10,0 10,0	No Filter

In the menu "**Module Settings**" several settings can be done concerning the whole module, e.g. address of the module, the character format, the Baudrate, the Logger-functions of the Data Logger, the Update Time, and so on...



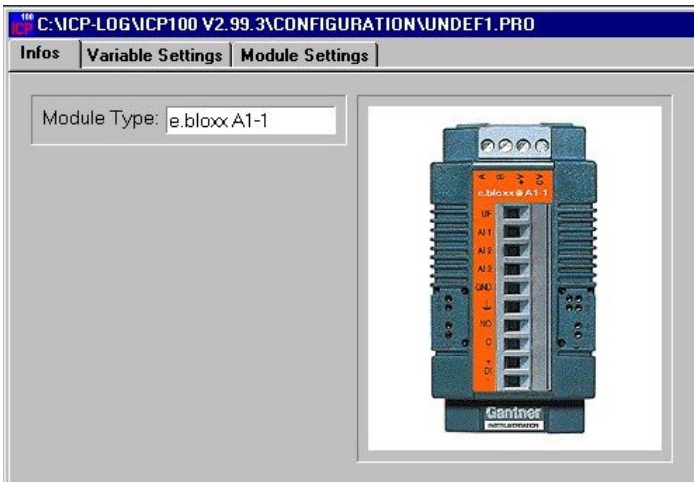
6. CONFIGURATION OF THE MODULES

6.1. Creating a new configuration:

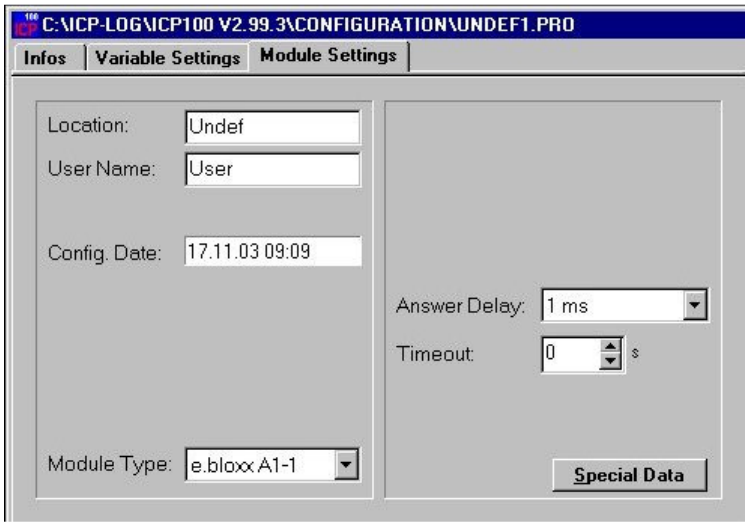
To create a new configuration select "*File*" and "*New File*" from the menu or click the following button:

On the screen you will find the window:

As a default setting the e.bloxx A1-1 is being shown on the screen. To define a configuration for the required module type you have to select the module type which fits best to your application in the "Module Settings".

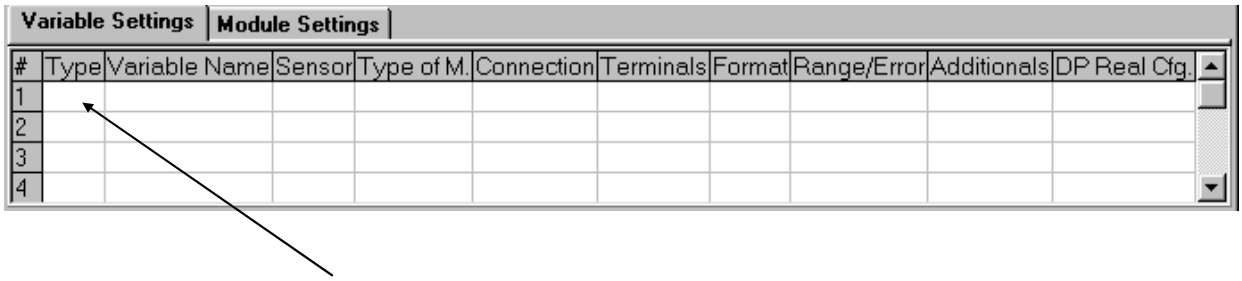


Refer to the following picture:



The inputs in these fields are independent from the selected interface!

Now you can configure the selected module in the menu "**Variable Settings**". The following picture shows you an example together with further information about the different fields:



To start configuration click the corresponding field and you can choose from several proposals.

Channel-Type: Each row in this table is corresponding with one channel. There are different kinds of channel-types:

- Analog Input
- Analog Output
- Digital Input
- Digital Output
- Arithmetic
- Alarm
- PID Controller
- Setpoint

In the field **Variable Name** for each channel a designation with max. 20 characters can be given.

In the column **Sensor** appears the designation of the connected sensor for the analog and digital sensor variables. The sensor can be selected from a list concerning the measurand and the principle of measurement. Also customized sensors can be defined in this field. The field remains empty when no sensor is connected to the channel.

In the column **Type of Measurement** the kind of measurement is selected: resistant measurement in 2-, 3- or 4-wire technology, voltage measurement "single ended" or "differential", etc.

The columns **Connection** and **Terminals** display how the selected sensor has to be connected to the sensor module. This might be important for documentation purposes.

In the column **Format** the format for the data-transmission via the bus is indicated. For the transmission and representation as an ASCII-string the unit, section length and number of decimals are indicated. For the transmission in binary format the indications Boolean, Integer or Real are indicated in addition to these. The data format is shown in the column as a format-string with decimal point and unit.

In the column **Range/Error** the range limits for the test value recordings are entered. Depending on the range an optimum amplification of the signal is selected automatically. In addition the error handling of the Analog Input Variable and the Digital Output Variable can be defined. The sensor modules recognize violations of limiting values, communication time-outs and breakages of the sensor as errors. For Controller Variables the P-, I- and D-parts and for Analog Output Variables the output ranges can be defined.

In the column **Additionals** various functions for the individual sensor variables can be defined. With the Analog Sensor Variables you can choose between two types of filters, a digital low-pass for the suppression of higher-frequency photoelectric noise levels and an arithmetic signal averager for increasing the measuring accuracy. With the Digital Sensor Variables an indication of the time base is required with time-controlled inputs/outputs (frequency measurements and PWM). For the digital counter inputs a conversion factor can be indicated to multiply the counted measurand if necessary. For the Digital Output

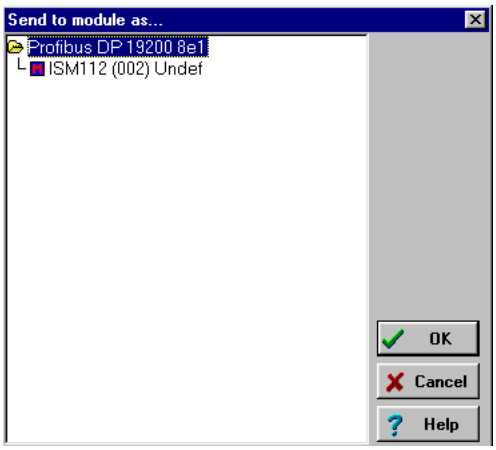
Variables and the Alarm Variables threshold values can be indicated to trigger the output. Furthermore the setup of a Controller Variable can be defined here and a variable can be related to an Analog Output Variable.

The column **Profibus-DP Configuration** appears, if the Profibus-DP Protocol is used. Different formats for data transmission can be selected to realize the connection to a higher-ranking system (no matter whether PC or SPC) as easily as possible.

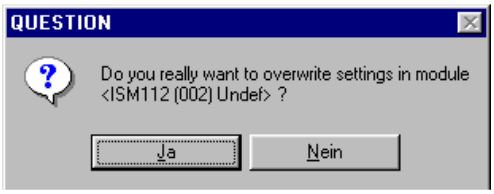
This new configuration has to be saved, clicking "*File*" and "*Save to File*" in the menu bar. Now this configuration has to be sent to the module, too. Select "*File*" and "*Send to Module as*" from the menu bar.

The window shown next appears and you have to select the module to which the configuration has to be sent.

Important: The module-type of the new configuration has to be equal to the module-type it has to be sent to!!!



After confirming with "*OK*" you will be asked once again if you really want to replace the current configuration in the module:

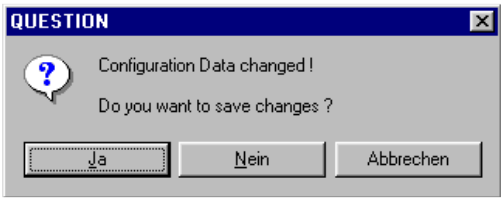


Now you will find the window where you have the possibility to select between Info / Measure / Variable Settings / Module Settings.

6.2. Configuration handling:

As soon as you change to the register card "**Variable Settings**" you can redefine the configuration as being described before.

After having finished the variable settings the data have to be sent into the module. This happens by opening the menu "*Measure*" and confirming the shown box on the right side or by clicking the download button .



6.3. Saving the configuration:

In the menu "*File*" there are several possibilities to save the configuration. Some of these already were shown in chapter 6.1. The configuration can be saved either to the harddisk/disk or directly to the sensor module. In "*Save to File as*" you can select the directory and the file name of the configuration. With "*Save to file*" the configuration is being saved to the current file. If you want to save the configuration to the module, you can choose "*Send to Module*" or "*Send to Module as*".

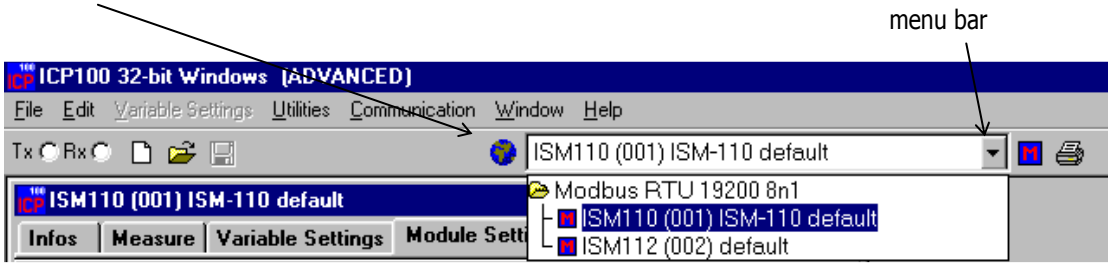
In the menu bar you will find two additional buttons:

Save the configuration to the harddisk or disk.

Send the current configuration to the module at any time.

7. CONNECTING SEVERAL MODULES

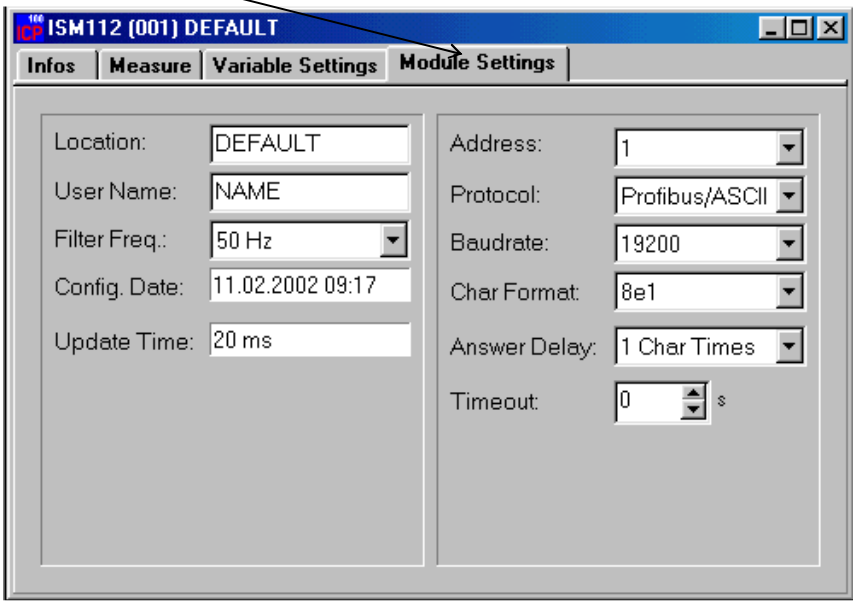
If several modules are connected at the same time, only the module with the lowest address is shown in the menu-window.



Notice that all modules have the same default-address (001) at the beginning. Therefore all the modules have to get a new address not equal to the default one and different from each other.

The necessary steps therefore are described now:

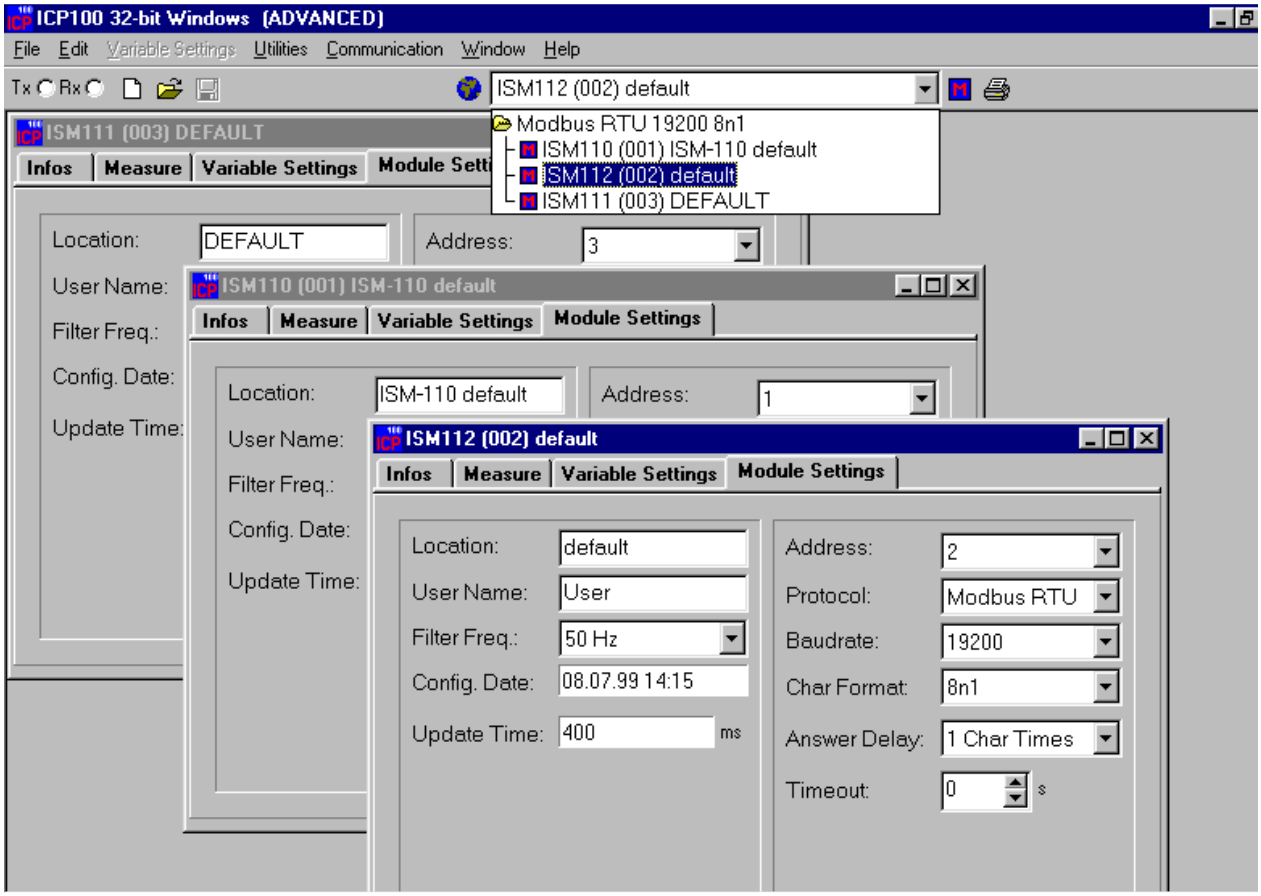
1. Connect only one module
2. Execute a bus scan by clicking the button
3. Select "*Module Settings*"



4. Select a new address (e.g. 2) in the "*Address*-field
5. The new configuration has to be sent to the module by clicking the button in the menu bar.

After each module has got its own address e.g. all of them can be connected with the connector ICM 100 to work on a common field-bus (refer to the user's manual).

To complete this procedure a bus scan has to be performed. →
Now the software should detect all of the modules and on clicking the respective window or selecting one module from the menu window all the modules can be configured in any sequence.
You can search for new modules by clicking the "bus scan"-Symbol at any time!


ICP100 32-bit Windows (ADVANCED)
File Edit Variable Settings Utilities Communication Window Help
Tx Rx
ISM112 (002) default
Modbus RTU 19200 8n1
ISM110 (001) ISM-110 default
ISM112 (002) default
ISM111 (003) DEFAULT
ISM111 (003) DEFAULT
Infos Measure Variable Settings Module Setti
Location: DEFAULT
Address: 3
User Name:
Filter Freq.:
Config. Date:
Update Time:
ISM110 (001) ISM-110 default
Infos Measure Variable Settings Module Settings
Location: ISM-110 default
Address: 1
User Name:
Filter Freq.:
Config. Date:
Update Time:
ISM112 (002) default
Infos Measure Variable Settings Module Settings
Location: default
User Name: User
Filter Freq.: 50 Hz
Config. Date: 08.07.99 14:15
Update Time: 400 ms
Address: 2
Protocol: Modbus RTU
Baudrate: 19200
Char Format: 8n1
Answer Delay: 1 Char Times
Timeout: 0 s

8. ERRORS AND CAUTIONS

As not all of the errors and cautions could have been mentioned before, some of them are described in the following parts:

8.1. No modules are found:

Refer to chapter 4.1

8.2. Flashing of the red ERR-LED:

The ERR-LED at the front side of the module has several functions and not all of them are error-functions. For detailed informations refer to the user manual.

ERR-LED is shining continuously:

- There is an error of the sensor which could be caused by:
- a faulty configuration
- a breakage of a sensor or a short-circuit of the line
- an exceeding of the range

ERR-LED is blinking:

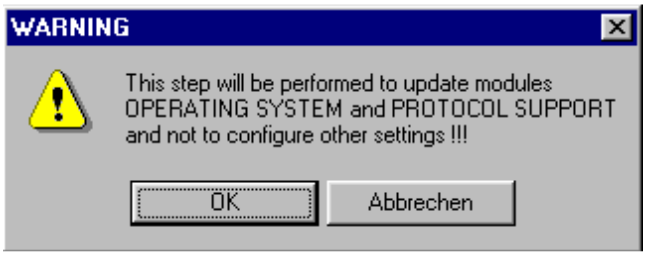
- the module has not been inquired for a certain period of time, the communication-timeout is active. This one can be defined in "Module Settings" at the Timeout-field.

8.3. Loss of the configuration / program:

The software of the sensor module can be destroyed due to incorrect operation or extreme EMC load, higher than the permitted limit. In this case the configuration program cannot find the module despite correct connections and signal or power-lines.

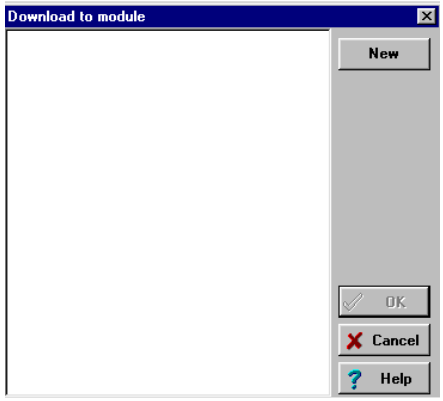
In this case - but also in case of a firmware-update - a new download to the module has to follow. Therefore click "*Utilities*" in the menu bar and then "*Download" - "Firmware*".

On the screen you will find the following message:

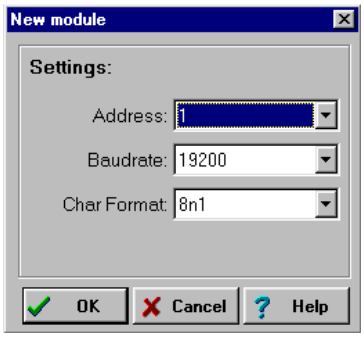


Confirm with „*OK*".

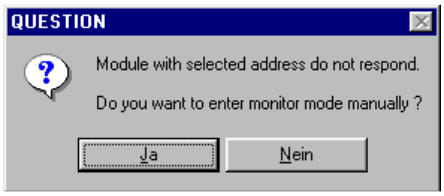
In the following window all of the installed modems are listed. Select the module for the download. If no module is listed or the module you are looking for is not available, click the button "*NEW*".



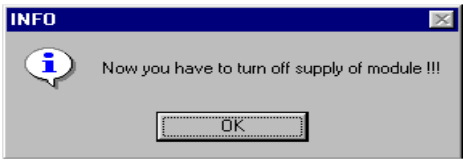
Now a new module can be defined.

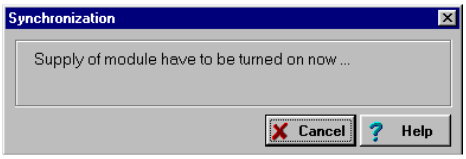


Usually you will find the following message on the screen. Please confirm.



Now you have to switch on and off the selected module.

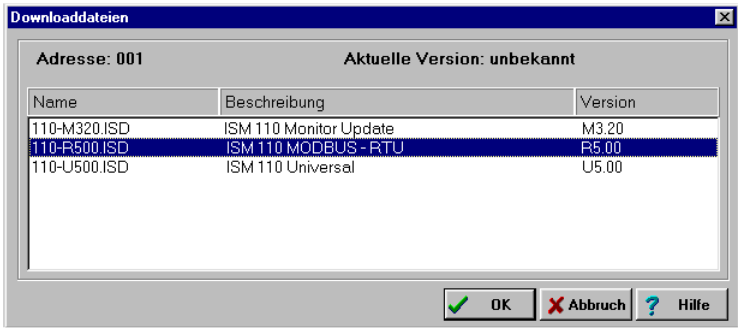




As soon as all of these things are done a new window appears which shows you different download-files.

Select the file that corresponds to the desired protocol and the module will be loaded automatically. This takes about 1 to 2 minutes.

Now the module can be configured once again.



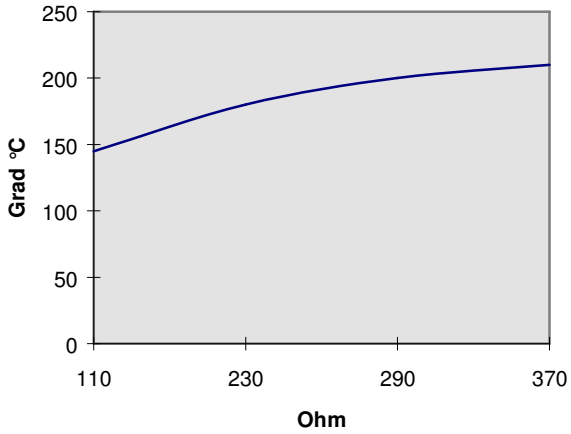
9. EXAMPLES

9.1. Measurement of the temperature:

In laboratory measurements the characteristic line of a very special temperature-sensor has been recorded. A linearization has to be realized with the help of a ISM111. With this linearized sensor the temperature of a tank should be kept between 160°C and 180°C. When temperature exceeds 180°C a cooling is switched on, controlled by an analog output. As soon as temperature drops down to less than 160°C the cooling has to be switched off.

Recorded data:

Resistance	Temperature
1100 Ω	145 °C
2300 Ω	180 °C
2900 Ω	200 °C
3700 Ω	210 °C



7 necessary steps to configure the ISM111 - module:

1. In the configuration-program you have to define a new sensor in the "*Variable Settings*"-menu. In the column "*Type*" select "*Analog Input*".

2. Click into the column "*Sensor*", select the button "*New*" and type the sensor's name.

3. Now you will be asked for a description, the principle of measuring and the unit. Describe the sensor in the "*Description*"-field, select "*Resistance*" in the "*Principle of Measuring*"-field. In the "*Unit*"-field type "Degree Celsius [°C]".

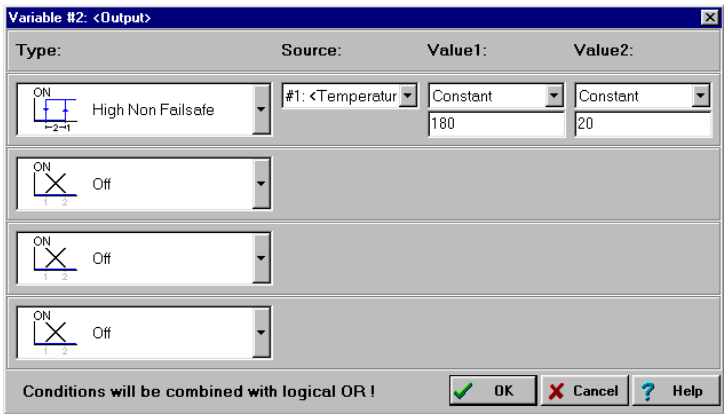
4. Now click the button "*Lineariz.*" to do the linearization. Double-click the blue-colored field and in the opening window enter the values of the first point. For another point click "*New*".
   Attention: All the values have to be in the absolute unit!
   e.g.: 1mV = 0.001V; 1kOhm = 1000 Ohm; 1mA = 0.001A etc.

5. Confirm with "*OK*" and the new sensor is already defined. The sensor can be used in the same manner as all the other sensors.

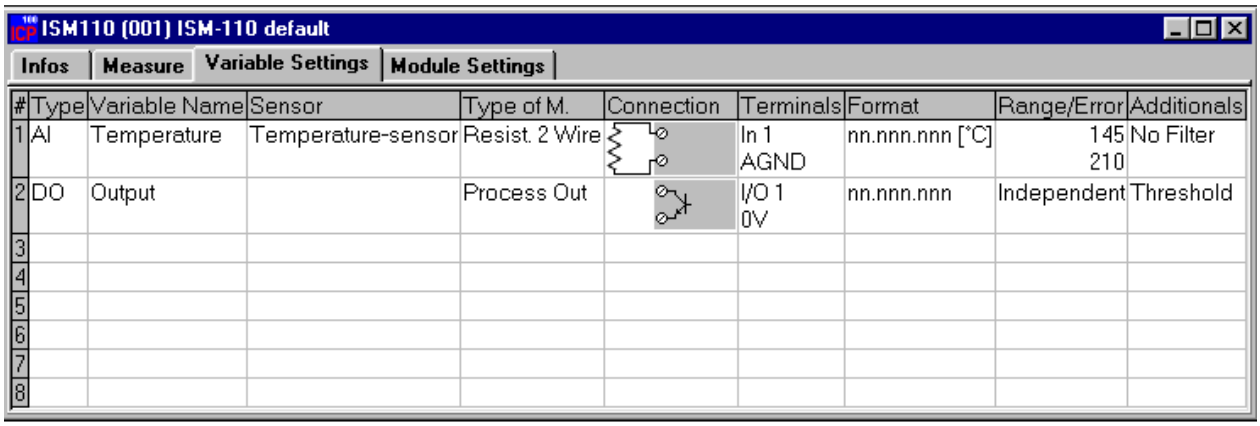
6. As being described in the exercise, one digital output has to be set to the "High"-condition as soon as the temperature exceeds 180°C and the digital output has to be reset as soon as the temperature is below 160°C. Therefor a "*Digital Output*" has to be defined in the "*Type*"-field. For the digital output you have to select "*Process Out*", clicking the "*Type of M.*" column.

7. The exercise can be solved with the help of a hysteresis. Click the "*Additionals*"-column and in the following window you can decide under which conditions the digital output has to be set to a certain condition. The necessary hysteresis for this example is called "*High Non Failsafe*". In the "*Source*"-field select the channel the characteristic of the digital output depends on. With "*Value1*" the first boundary is defined. "*Value2*" informs you about the width of the hysteresis.

The window for the hysteresis should look like this:



The main-window "*Variable Settings*" shows the whole configuration:

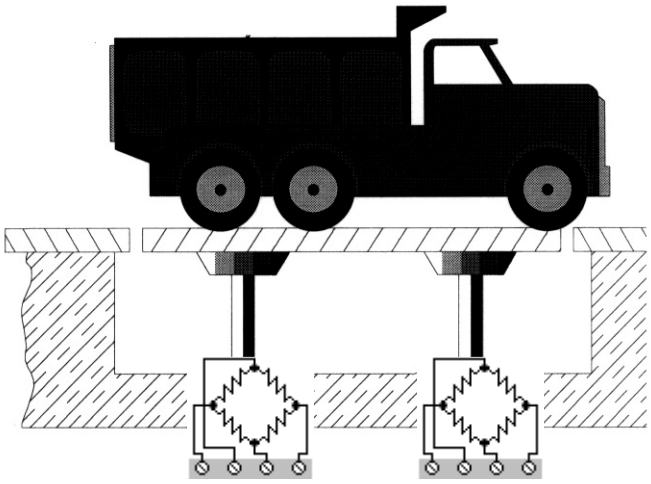


#	Type	Variable Name	Sensor	Type of M.	Connection	Terminals	Format	Range/Error	Additionals
1	AI	Temperature	Temperature-sensor	Resist. 2 Wire		In 1 AGND	nn.nnn.nnn [°C]	145 210	No Filter
2	DO	Output		Process Out		I/O 1 0V	nn.nnn.nnn	Independent	Threshold
3									
4									
5									
6									
7									
8									

9.2. Measurement of the weight:

A weighing machine for a lorry should be equipped. When the lorry does not move the weight should be set equal to zero. Now the lorry may be loaded and this weight should be read from a special place.

The application needs 2 weighing-sensors with a bridge in 4-wire-technic. The addition of these two sensors is equal to the total weight of the load. The zero adjustment should be possible by pressing a button near the weighing-machine.



Technical data for the weighing-sensors: 0 V 0 kg
1 V 10.000 kg

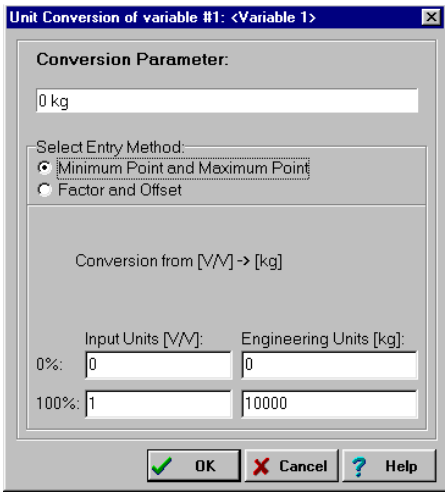
To configure the module the followings steps are necessary:

1. To measure the weight two "*Analog Input*"-channels have to be defined in the "*Variable Settings*"-menu. Therefore click into the "*Type*"-column. Select "*Bridge*" in the "*Sensor*"-column.

2. The maximum weight to be measured is 20000kg. Therefore you have to define five-digit numbers before the comma as an output-format in the "*Format*"-field. The output unit should be kg which you define in the "*Unit*"-field.

3. The zero adjustment for the measuring-bridges has to be done in the "*Range/Error*"-field. In the upper part of the window the range can be defined, in the lower part you have to define how the "*Zero Calibration*" should be done.

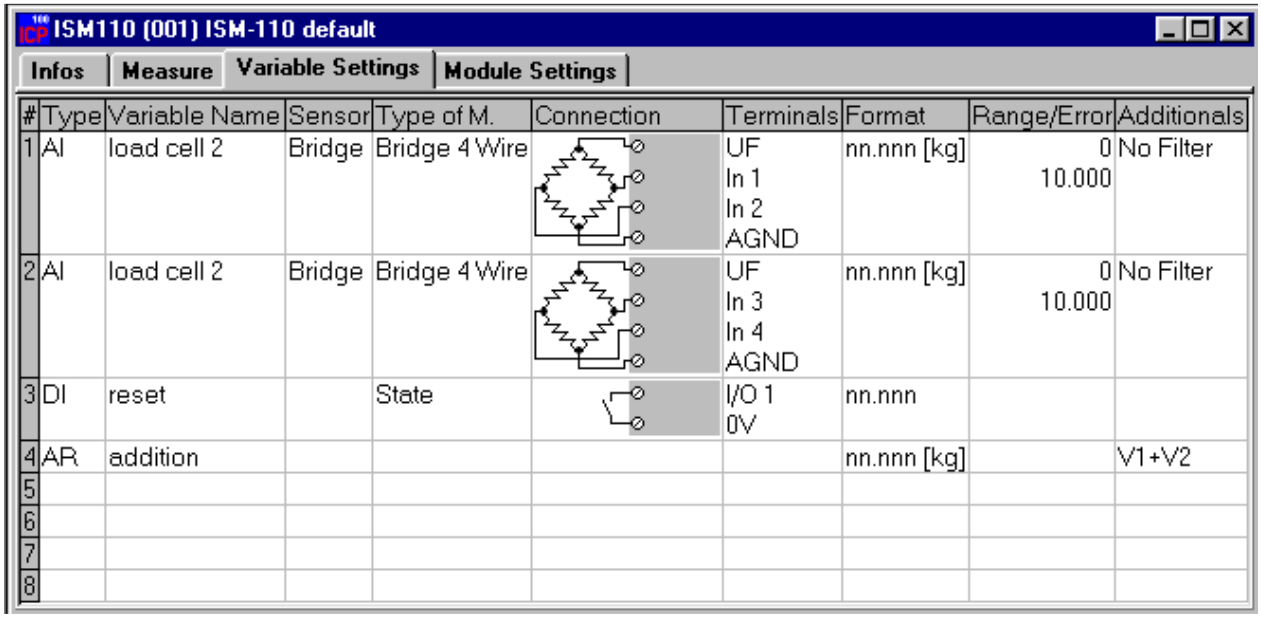
   Host
   Dig. IO1
   Dig. IO2
   On Variable result



4. With "Host" the computer does the zero adjustment. In this example select the first digital input to do the zero adjustment with a push-button. With "*On variable result*" the zero adjustment can be done by anyone of the defined channels.

5. To calculate the total weight an "*Arithmetic*"-channel has to be defined in the "*Type*"-field. The formula for this addition has to be written in the "*Additionals*"-field. The output-format does not change.

The main-window "*Variable Settings*" shows the whole configuration:



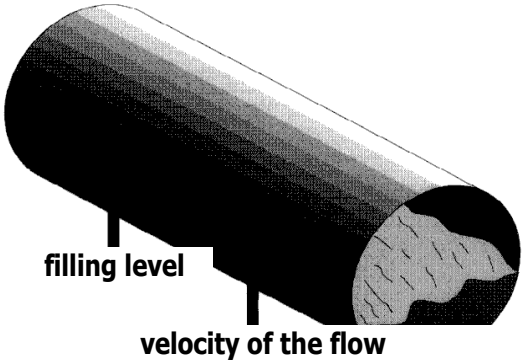
#	Type	Variable Name	Sensor	Type of M.	Connection	Terminals	Format	Range/Error	Additionals
1	AI	load cell 2	Bridge	Bridge 4 Wire		UF In 1 In 2 AGND	nn.nnn [kg]	0 10.000	No Filter
2	AI	load cell 2	Bridge	Bridge 4 Wire		UF In 3 In 4 AGND	nn.nnn [kg]	0 10.000	No Filter
3	DI	reset		State		I/O 1 0V	nn.nnn		
4	AR	addition					nn.nnn [kg]		V1+V2
5									
6									
7									
8									

9.3. Measurement of flow:

The quantity of flow in a pipe with a diameter of 20cm should be calculated with an intelligent sensor module ISM 111.

You have to measure:

- filling level
- velocity of the flow



The module should calculate the flow-surface and the quantity of flow out of the measured values.

To configure the module the following steps are necessary:

1. To measure the filling level and the velocity of the flow two analog input channels are needed which are defined in the "*Variable Settings*"-menu. Click the "*Type*"-field and select "*Analog Input*".

2. For both measurements select "*Voltage*" in the "*Sensor*"-field.

3. The output-format has to be defined in the "*Format*"-field. "*Field Length*" is the number of digits inclusive the comma. "*Precision*" is the number of digits right of the comma. The output-format is defined in the "*Unit*"-field. In this example we only need two digits left and one right of the comma. The units are cm and m/s.

4. Now the conversion of Volt to the necessary format has to be done. You have to enter the minimum and maximum values in the "*Conversion*"-field. These are:

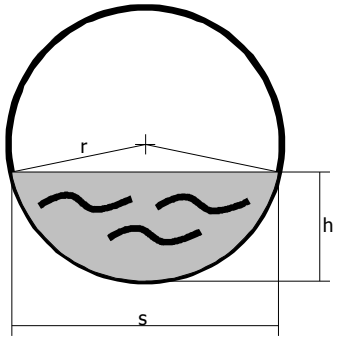
Filling level:	0%	0V	at	0cm
	100%	10V	at	20cm
velocity of flow:	0%	0V	at	0m/s
	100%	10V	at	10m/s

5. To get a better precision the measurement-range can be limited in the "*Range/Error*"-field.

6. To calculate the width of the surface an "*Arithmetic*"-channel has to be defined in the "*Type*"-field. The format and the unit are defined in the "*Format*"-field. The unit is cm.

7. The formula for the calculation of the width of the surface has to be added to the "*Additionals*"-field. The channels and functions for the calculation are shown as buttons. When clicking them, they are placed to the formula automatically.

8. To calculate the flow-surface continue as shown in step 6 and 7. At the end the two arithmetic values have to be multiplied in another "*Arithmetic*"-channel to get the result of the quantity of the flow.



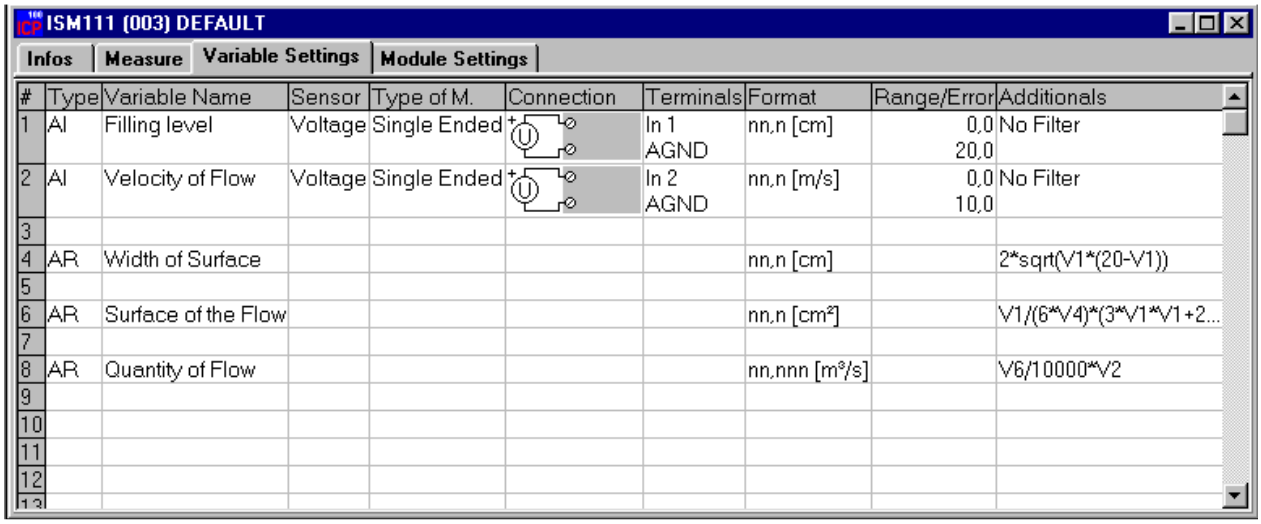
Here is the formula for the calculation of the surface:

$A = h/(6s) \times (3h^2 + 2s^2)$

$s = 2 \times \sqrt{(h \times (2r-h))}$

$r = 10$ cm

The main-window "*Variable Settings*" shows the whole configuration:



#	Type	Variable Name	Sensor	Type of M.	Connection	Terminals	Format	Range/Error	Additionals
1	AI	Filling level	Voltage	Single Ended		In 1 AGND	nn,n [cm]	0,0 20,0	No Filter
2	AI	Velocity of Flow	Voltage	Single Ended		In 2 AGND	nn,n [m/s]	0,0 10,0	No Filter
3									
4	AR	Width of Surface					nn,n [cm]		2*sqrt(V1*(20-V1))
5									
6	AR	Surface of the Flow					nn,n [cm²]		V1/(6*V4)*(3*V1*V1+2...
7									
8	AR	Quantity of Flow					nn,nnn [m³/s]		V6/10000*V2
9									
10									
11									
12									
13									

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